REMARKS

In section 01 of the Office Action, the Examiner objected to claims 1 and 2 asserting that the "Kalman filter" appears to be a trademark. However, a Kalman filter is a well known type of filter and is not trademarked, at least as far as applicants are aware. Moreover, the Examiner's attention is directed to the Foxlin patent which refers to a Kalman filter without indicating that this type of filter is trademarked.

In section 02 of the Office Action, the Examiner suggested an amendment to claim 12. Applicants have accordingly made this amendment. A similar amendment has been made to claim 14.

In section 03 of the Office Action, the Examiner suggested that claims 4, 10, and 14 be amended. Applicants have accordingly amended claims 4, 10, and 14.

In sections 05 and 06 of the Office Action, the Examiner rejected claim 11 under 35 U.S.C. §101 as being directed to a non-statutory class of invention. Particularly, the Examiner asserts that the limitation "human model provided as input" recites a positive relationship to the human body. The Examiner then asserts that the human body is a non-statutory class of

invention which makes claim 11 directed to a non-statutory class of invention.

However, as one skilled in the art will understand, a human model, at least in one embodiment, is a model of the relevant characteristics of the human body. As a specific example given in the present application, these characteristics can be those that model human motion.

Thus, one skilled in the art will understand that the human model limitation of claim 11 is not directed a human but to a model of the relevant characteristics of a human.

Accordingly, claim 11 is directed to statutory subject matter.

In sections 07-09 of the Office Action, the Examiner rejected claims 4, 5, 6, 9, 15, 16, and 17 under 35 U.S.C. §102(b) as being anticipated by the Root patent.

The Root patent discloses a GPS-based personal performance monitor and feedback device 101 that includes input buttons 115 to set a user's personal data and preferences and to input feedback options and targets, and a display 112 that displays various data. A GPS receiver antenna 301 (Figure 3) is plugged into a

connector 109 using a plug 122, and a set of audio headphones 202 (Figure 2) is plugged into a connector 108 using a plug 120. A button 102 turns the device 101 on and commences an initialization process. An LED status indicator 111 indicates device initialization, and a lock/light button 110 locks programmed settings. A pause/position button 104 temporarily pauses collection of performance data or, if held for a longer period of time (such as 2 seconds), temporarily replaces the radio band and frequency data on the display 112 with the latest latitude and longitude position. A "Now!" button 105 initiates updating of the latest measures of athletic performance. Atmospheric pressure is measured by a barometric pressure sensor 610 (Figure 6).

The device 101 can be hooked to a user's belt or waistband, strapped around the user's upper arm, or simply held by the user.

Figure 6 is an electrical schematic of the device 101. A CPU 602 controls the operation of the device 101 and is connected to a GPS receiver 604, an AM/FM/TV radio receiver 607, an audio module 606, a memory 608, input controls 603, the barometric pressure sensor 610, a display 605, a heart rate sensor 611, a body temperature sensor 612, a modem 613, a serial-type

port 118, an infrared-type port 124, and an external personal computer 701. The GPS receiver 604 is connected to the antenna 301.

Figure 10 shows configuration menus for the device 101. The main menus are designated as "exercise session type", "pre-set course", "performance targets", "information cycles", "user data", and "system set-up".

The user turns on the device 101 and sets user preferences using the menu control buttons 115 and the display 112. Preference options include performance targets, frequency of feedback information cycles, level feedback detail, and personal user data as shown in the menus of Figure 10.

Once the GPS receiver 604 confirms by way of the display 112, the LED status indicator 111, or an audible signal that a reliable geographical position fix is acquired, the user presses the start button 103 and commences an exercise session. The GPS receiver 604 continuously determines the latitude and longitude coordinates of the user's current position as well as the user's current speed and direction of travel, and stores this data in the memory 608 along with other information such as the date and time that each position is acquired. Performance data is calculated from this information.

Recommendations to increase or decrease the level of effort to meet pre-set performance targets are then determined.

At pre-set intervals, the performance data is provided to the user through the set of audio headphones 202 by way of the audio module 606 or through the display 112. Alternatively, the user can immediately call up this performance data by pressing the "Now!" button 105. Monitoring can be temporarily suspended by pressing the pause/position button 104 and can be resumed by pressing the start button 103.

The measured parameters such as average speed and pace, exercise type, average sustained heart rate, elapsed distance and time, and so forth can be optionally used to automatically verify that an exercise session has actually occurred.

The device 101 can provide a total health monitor based on sensors such as a heart rate sensor or body temperature sensor, and can provide a way for scientists and medical researchers to accurately and consistently monitor a group of individuals and study the long term relationship between exercise and health.

Independent claim 4 recites a motion classification unit that classifies motion based on

motion sensors. The Root patent does not disclose a motion classification unit that classifies motion based on motion sensors.

The Examiner asserts that the central processor unit 602 shown in the Root patent is a motion classification unit. However, there is no description in the Root patent that the central processor unit 602 classifies motion based on motion sensors. The Root patent does disclose that a smart algorithm based on measured parameters such as exercise type can automatically determine if the user has temporarily suspended exercising or can automatically verify that an exercise session has actually occurred. However, there is no disclosure in the Root patent that exercise type is based on data from motion sensors.

Therefore, because the Root patent does not discloses that exercise type is based on data from motion sensors, the Root patent does not anticipate independent claim 4.

Moreover, the only other place that exercise type is shown in the Root patent is in Figure 10 which presents the menus that the user can use to manually enter certain preferences into the device 101. One of these preferences is exercise type. Thus, Figure 10

suggests that exercise type is manually entered and is not based on motion sensors.

Therefore, the Root patent does not suggest the invention of independent claim 4. Accordingly, independent claim 4 would not have been obvious over the Root patent.

Because independent claim 4 is patentable over the Root patent, dependent claims 5, 6, and 9 are likewise patentable over the Root patent.

In addition, dependent claim 9 recites a filter that receives data from the motion classification unit and that provides an output to the motion classification unit and to the output unit.

The Examiner points to column 7, lines 52-56 for a disclosure of this filter. However, this portion of the Root patent merely states that a smart algorithm can filter out erroneous position points resulting from signal interference or from induced errors through the U.S. government's Selective Availability (SA) program, which intentionally limits the absolute accuracy of civilian GPS receivers. There is no disclosure that this filtering is based on motion classification or that this filtering provides an output to both a motion classification unit and an output.

Therefore, the Root patent does not anticipate dependent claim 9.

Furthermore, the filtering described in the Root patent is based on signal interference and errors purposely induced in the GPS system. Signal interference and errors purposely induced in the GPS system do not suggest filtering based on motion classification.

Therefore, the Root patent does not suggest the invention of dependent claim 9. Accordingly, dependent claim 9 would not have been obvious over the Root patent.

Independent claim 15 likewise recites motion classification based on sensed motion. As discussed above, the Root patent does not disclose or suggest using sensed motion in order to classify motion of a human.

Accordingly, independent claim 15 is not anticipated by and would not have been obvious over the Root patent.

Because independent claim 15 is patentable over the Root patent, dependent claims 16 and 17 are likewise patentable over the Root patent.

In sections 11-15 of the Office Action, the Examiner rejected claims 1, 2, 3, and 7 under 35 U.S.C. §103(a) as being unpatentable over the Root patent in view of the Foxlin patent.

Independent claim 1 requires, *inter alia*, (i) a motion classification unit that receives data from sensors and (ii) a Kalman filter that receives data from the motion classification unit and from the sensors, and that provides an output to the motion classification unit and to an energy estimator unit.

As discussed above, the Root patent does not disclose or suggest motion classification based on information from sensors.

Similarly, the Foxlin patent does not disclose or suggest motion classification based on information from sensors. Instead, the Foxlin patent discloses a sensor apparatus that senses yaw, pitch, and/or roll of a human body, particularly the head. The sensor apparatus can be used in virtual reality machines to track motion of a user's head. For such an application, the Foxlin patent does not suggest motion compensation.

Accordingly, because neither the Root patent nor the Foxlin patent suggests motion classification to one of ordinary skill in the art, independent claim 1 is not unpatentable over the Root patent in view of the Foxlin patent.

Moreover, the Root patent does not disclose the use of a Kalman filter. The Foxlin patent discloses that

the sensor apparatus includes gyroscopes and a drift compensator 1327 that compensates for drift in the outputs of the gyroscopes caused by bias and the integration of noisy signals over time. The Foxlin patent further discloses that the drift compensator 1327 may be implemented, in part, with a Kalman filter that utilizes statistical data about human head motion.

However, the Foxlin patent does not disclose or suggest that a Kalman filter be connected to receive motion classification data as well as sensor data as required by independent claim 1. Therefore, the Foxlin patent cannot suggest the use in the device 101 of the Root patent of a Kalman filter that receives motion classification data as well as sensor data.

Accordingly, because neither the Root patent nor the Foxlin patent suggests a Kalman filter that receives motion classification data as well as sensor data, independent claim 1 is not unpatentable over the Root patent in view of the Foxlin patent.

Independent claim 2 recites sensors that sense a human, an energy estimator unit and a health monitor unit that receive data from the sensors, and a Kalman filter that receives data from the sensors and that

provides an output to the energy estimator unit and the health monitor unit.

As noted above, the Root patent does not disclose a Kalman filter. The Foxlin patent does disclose a Kalman filter but only for compensating for the drift of inertial sensors. The Foxlin patent does not disclose or suggest using a Kalman filter for providing inputs to an energy estimator unit and a health monitor unit.

Moreover, because the device 101 as disclosed in the Root patent does not rely on gyroscopes or other inertial sensors, it cannot be reasonable argued the Foxlin patent suggests any use of a Kalman filter for the device 101 disclosed in the Root patent.

Accordingly, because neither the Root patent nor the Foxlin patent suggests a Kalman filter that provides an output to an energy estimator unit and a health monitor unit, independent claim 2 is not unpatentable over the Root patent in view of the Foxlin patent.

Because independent claim 2 is patentable over the Root patent in view of the Foxlin patent, dependent claims 3 and 7 are likewise patentable over the Root patent in view of the Foxlin patent.

In sections 16-23 of the Office Action, the Examiner rejected claims 8, 10, 11, 12, 13, and 14 under 35 U.S.C. §103(a) as being unpatentable over the Root patent in view of the Foxlin patent and further in view of the Vock patent.

As discussed above, neither the Root patent nor the Foxlin patent discloses or suggests motion compensation based on data from motion sensors. Moreover, the Examiner has not established that the Vock patent discloses or suggests motion compensation based on data from motion sensors.

Accordingly, the Examiner has not made out a prima facie case of obviousness with respect to independent claim 4 with respect to the Root patent, the Foxlin patent, and the Vock patent.

For this reason, independent claim 4 is patentable over the Root patent in view of the Foxlin patent and further in view of the Vock patent. Because independent claim 4 is patentable over the Root patent in view of the Foxlin patent and further in view of the Vock patent, dependent claim 8 is likewise patentable over the Root patent in view of the Foxlin patent and further in view of the Vock patent.

Independent claim 10 requires a motion classification unit that processes data from inertial sensors, an altimeter, and magnetic sensors to provide output data that identifies motion type and distance traveled.

As should be clear from above discussion, neither the Root patent nor the Foxlin patent discloses or suggests motion compensation based on data from inertial sensors, an altimeter, and magnetic sensors. Moreover, the Examiner has not established that the Vock patent discloses or suggests motion compensation based on data from inertial sensors, an altimeter, and magnetic sensors.

Accordingly, the Examiner has not made out a prima facie case of obviousness with respect to independent claim 10 with respect to the Root patent, the Foxlin patent, and the Vock patent.

For this reason, independent claim 10 is patentable over the Root patent in view of the Foxlin patent and further in view of the Vock patent.

Because independent claim 10 is patentable over the Root patent in view of the Foxlin patent and further in view of the Vock patent, dependent claims 11, 12, and 13 are likewise patentable over the Root patent in view

of the Foxlin patent and further in view of the Vock patent.

In addition, dependent claim 11 recites a human model that is provided as an input to a measurement prefilter. The Root patent, the Foxlin patent, and the Vock patent do not either alone or in combination disclose use of a human model.

Accordingly, for this additional reason, dependent claim 11 is patentable over the Root patent in view of the Foxlin patent and further in view of the Vock patent.

Independent claim 14 requires a motion classification unit that processes data from inertial sensors, an altimeter, and magnetic sensors to provide output data that identifies motion type and distance traveled.

As discussed above, neither the Root patent nor the Foxlin patent discloses or suggests motion compensation based on data from inertial sensors, an altimeter, and magnetic sensors. Moreover, the Examiner has not established that the Vock patent discloses or suggests motion compensation based on data from inertial sensors, an altimeter, and magnetic sensors.

Accordingly, the Examiner has not made out a prima facie case of obviousness with respect to independent claim 14 with respect to the Root patent, the Foxlin patent, and the Vock patent.

For this reason, independent claim 14 is patentable over the Root patent in view of the Foxlin patent and further in view of the Vock patent.

CONCLUSION

In view of the above, it is clear that the claims of the present application patentably distinguish over the art applied by the Examiner. Accordingly, allowance of these claims and issuance of the above captioned patent application are respectfully requested.

Respectfully submitted,

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